

Armed Forces College of Medicine

AFCM



The Cerebral Hemispheres

BY
Prof Azza Kamal
&
Dr Walaa Baher

Intended Learning Outcomes

By the end of this lecture , the student will be able to:

1. **List the layers of the cerebral cortex and the cells forming them.**
2. **Compare between the structure of the sensory and motor cortex.**
3. **Name the major sulci, gyri, poles & lobes of the cerebral hemispheres.**

Layers of the cerebral cortex



The Cerebral Cortex is formed of **six (6)** layers

Layers of the cerebral cortex



1) <u>Molecular layer:</u>

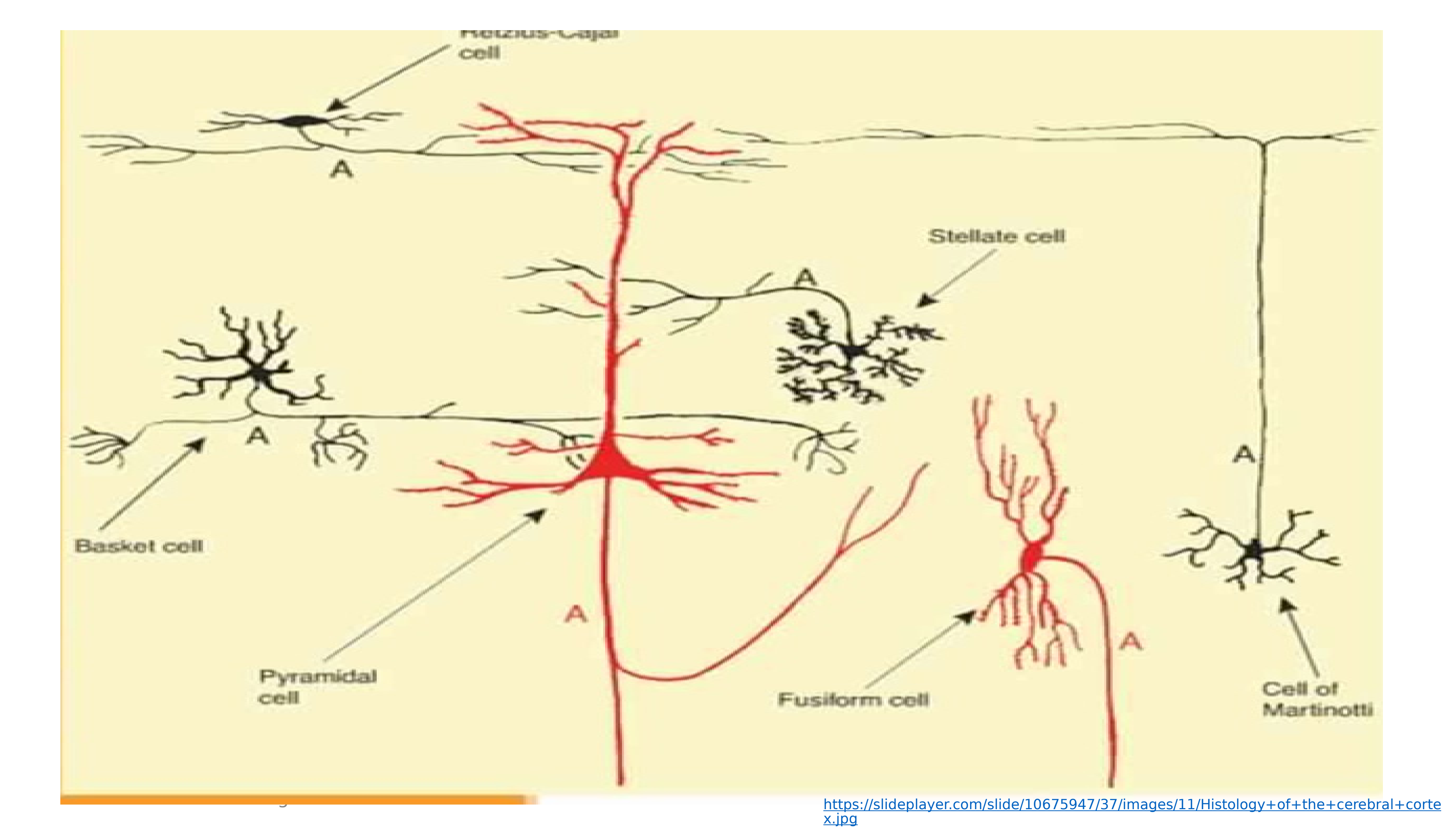
Most superficial layer.

Formed mainly of interlacing nerve fibers and cells of Cajal (absent in adult brain).

Nerve fibers include terminal denderites of pyramidal and fusiform cells and axons of Martinotti cells

<u>2) External granular layer:</u>

- It is formed of closely packed granule cells.
- Their dendrites terminate in the molecular layer.
- Their axons descend to the deep cortical layers.



https://slideplayer.com/slide/10675947/37/images/11/Histology+of+the+cerebral+cortex.jpg

Layers of the cerebral cortex



3) External pyramidal layer:

- It contains superficial layer of small and medium sized pyramidal cells and deep layer of larger cells.
- Their dendrites pass to the first layer, while their axons enter the white matter.

4) Internal granular layer:

-It is formed of closely packed granule cells.

- Their dendrites terminate in the molecular layer
- Their axons descend to the deep cortical layers.
- It also contains the outer band of Baillarger.

Layers of the cerebral cortex



5) Internal pyramidal layer:

Formed of large and giant pyramidal cells.

-Their dendrites pass to the fourth layer

- Their axons project to enter the white matter as projection fibres. **In motor area 4 these cells called giant cells of Betz.**

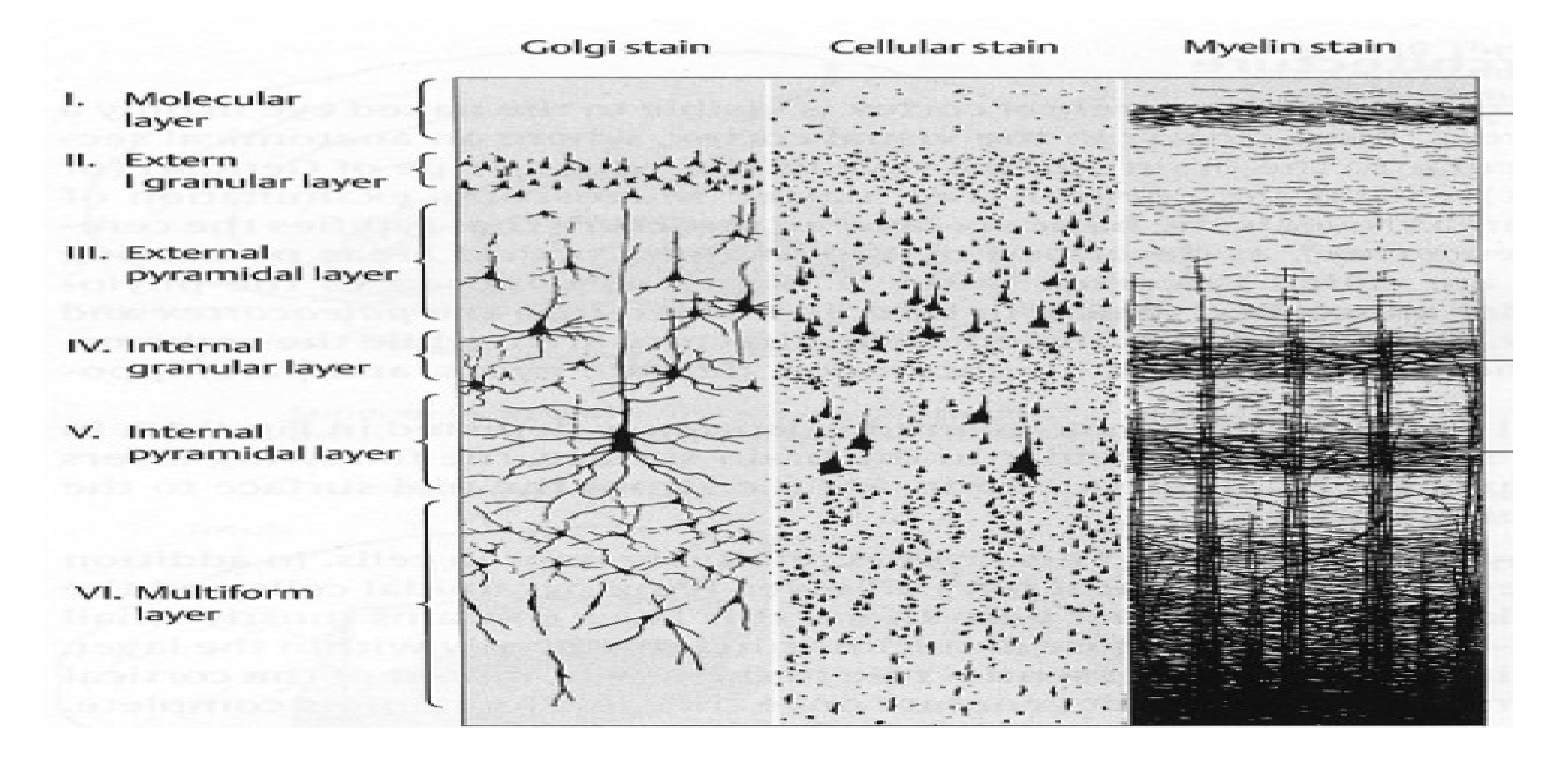
- It also contains the internal band of Baillarger.

6) The mutiform layer:

It contains fusiform cells.

Their dendrites pass to the molecular layer

- Their axons enter the white matter as projection fibres.



http://www.learnneurosurgery.com/uploads/1/6/6/8/16689668/_8909191_orig.png

Differences between sensory and motor cortex 

Motor cortex

1) It is the thickest zone in the whole cortex.

2) Large pyramidal cells are found in layers III and V , while giant pyramidal cells (Betz) are seen in the fifth layer.

3) Granule cells are rare or absent.

Sensory cortex

1) It is relatively thinner than motor cortex.

2) It contains closely packed granule cells.

3) Pyramidal cells are ill defined.

Quiz



1) **Which of the following cells are not found in the cerebrum:**

a) Pyramidal cells.

b) Purkinje cells.

c) Granule cells.

d) Fusiform cells.

e) Cells of Martinotti

2) Giant cells of Betz are present in the following layer of the cerebral cortex :

a)Pleomorphic

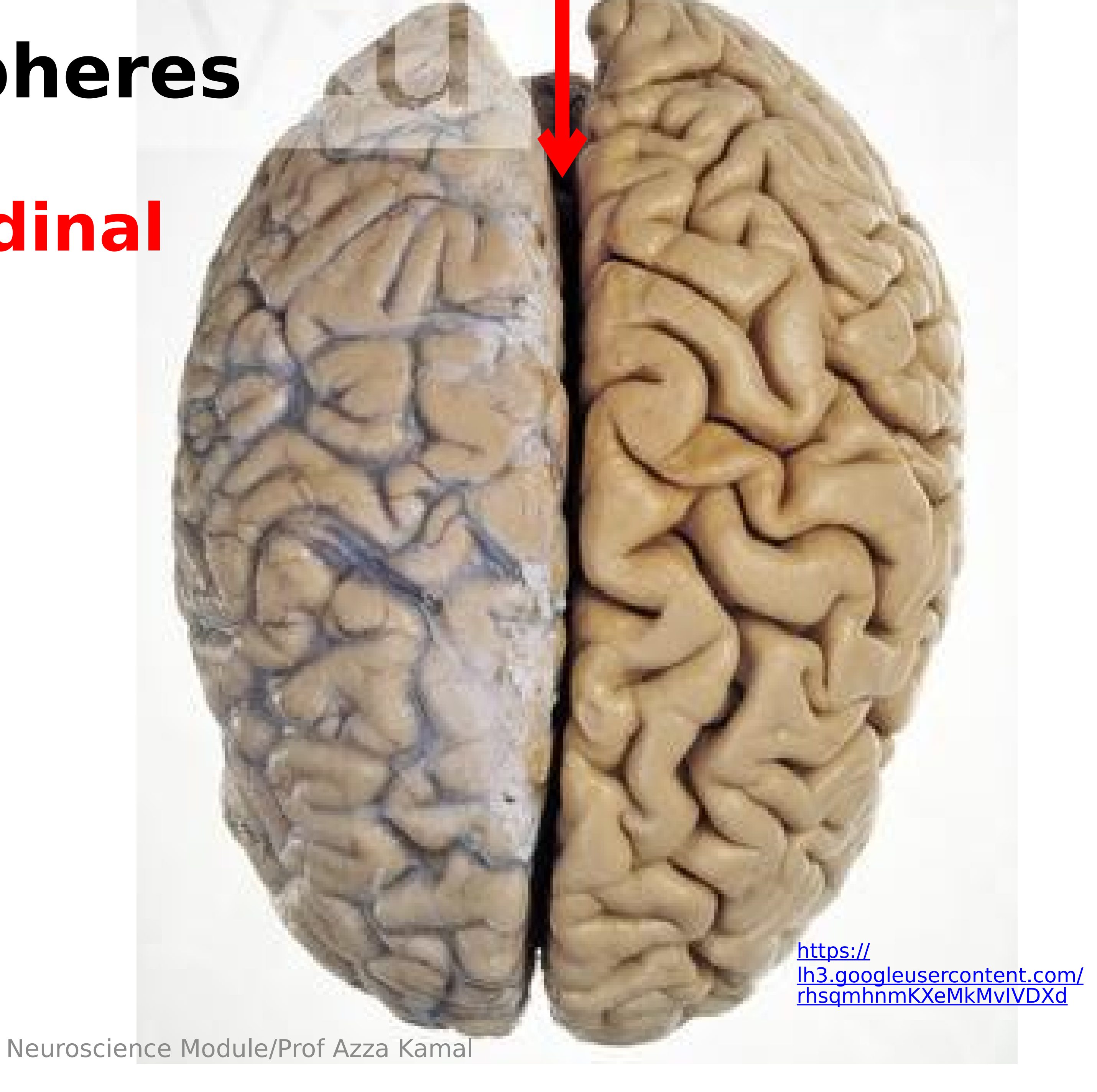
b) External granular

c)Internal granular

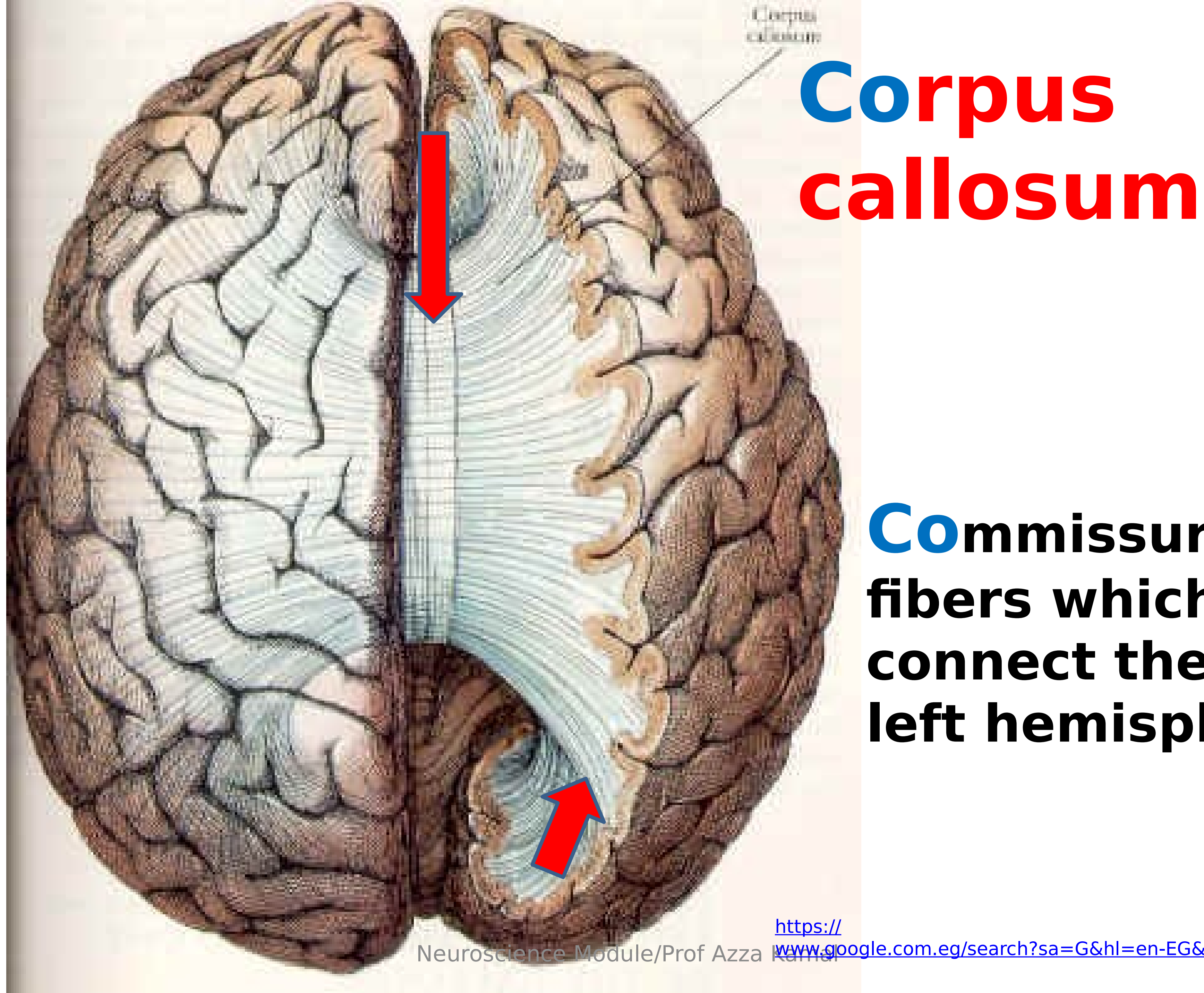
d)External pyramidal.

e) Internal pyramidal.

he cerebral hemispheres



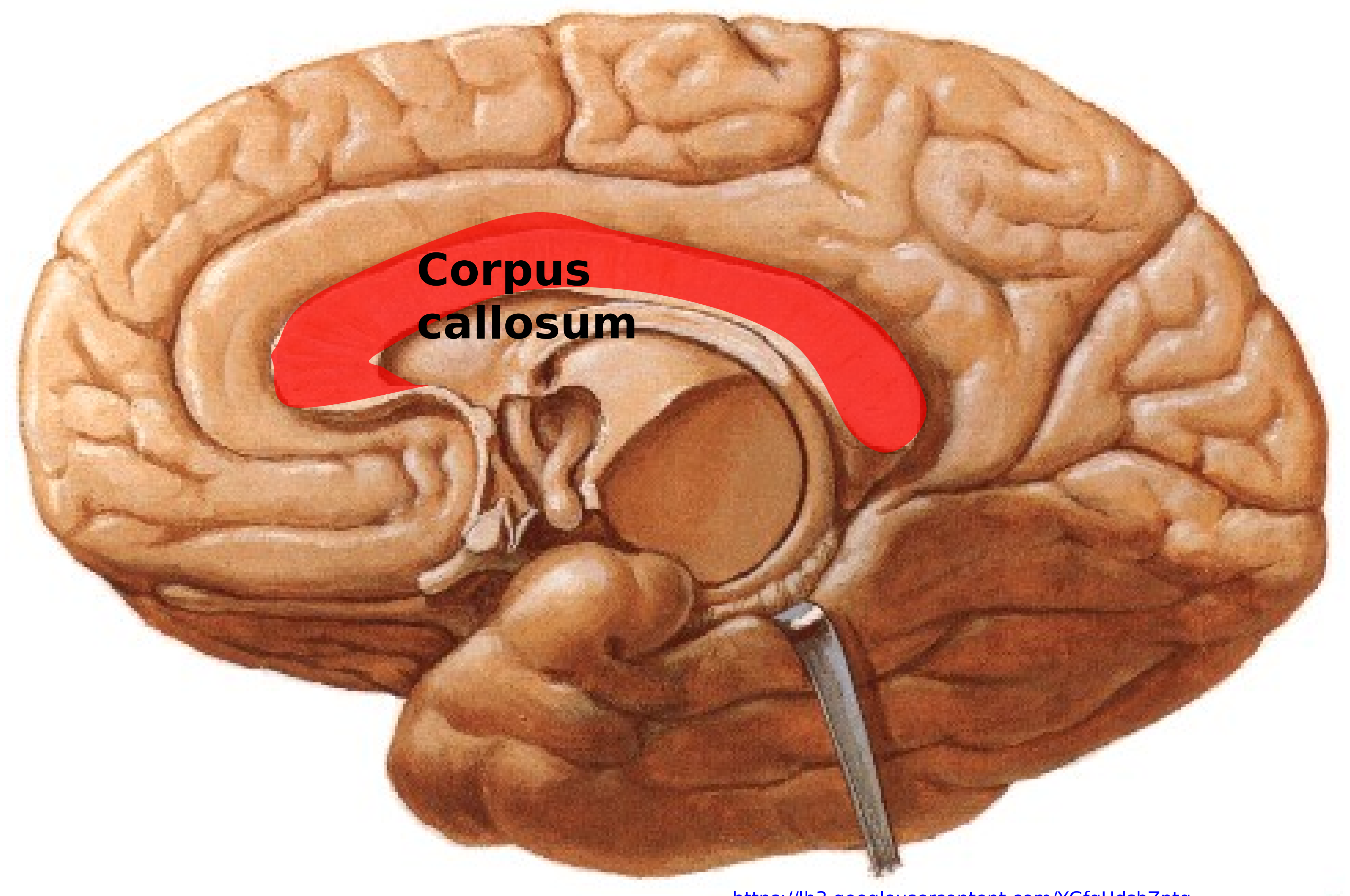
Right & left cerebral hemispheres



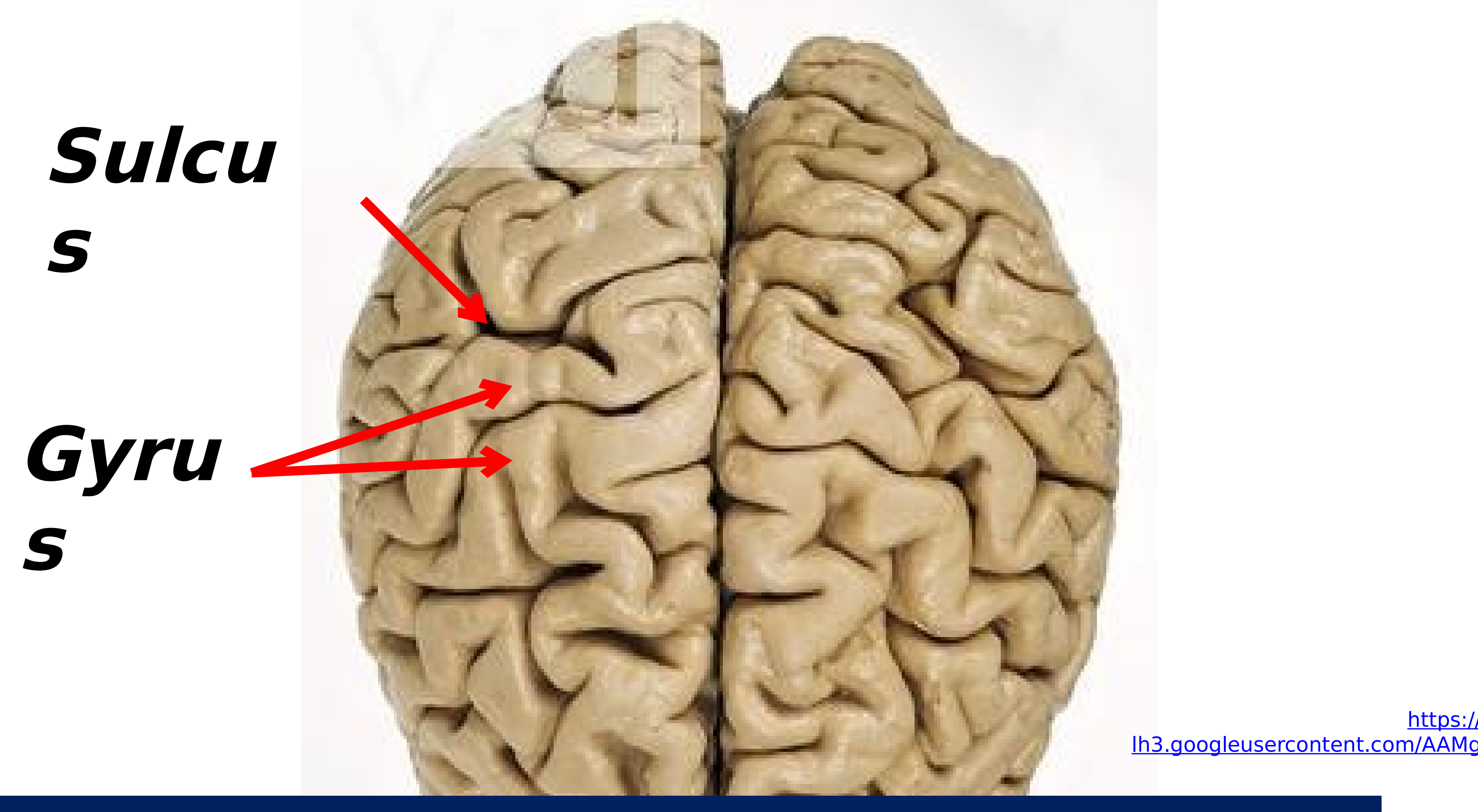
Corpus callosum

Commissural fibers which connect the right & left hemispheres

https://www.google.com.eg/search?sa=G&hl=en-EG&q=corpus+callosum

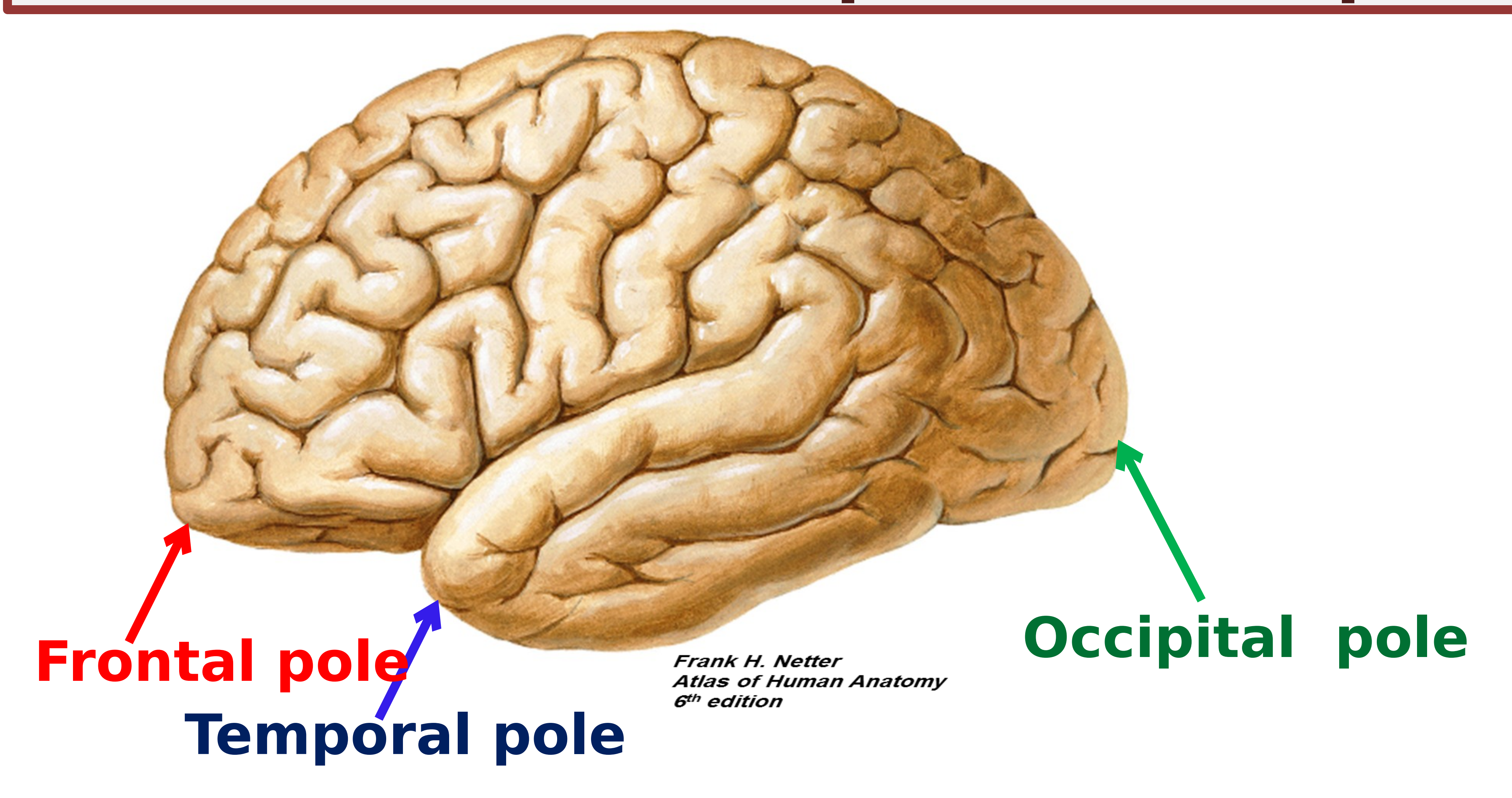


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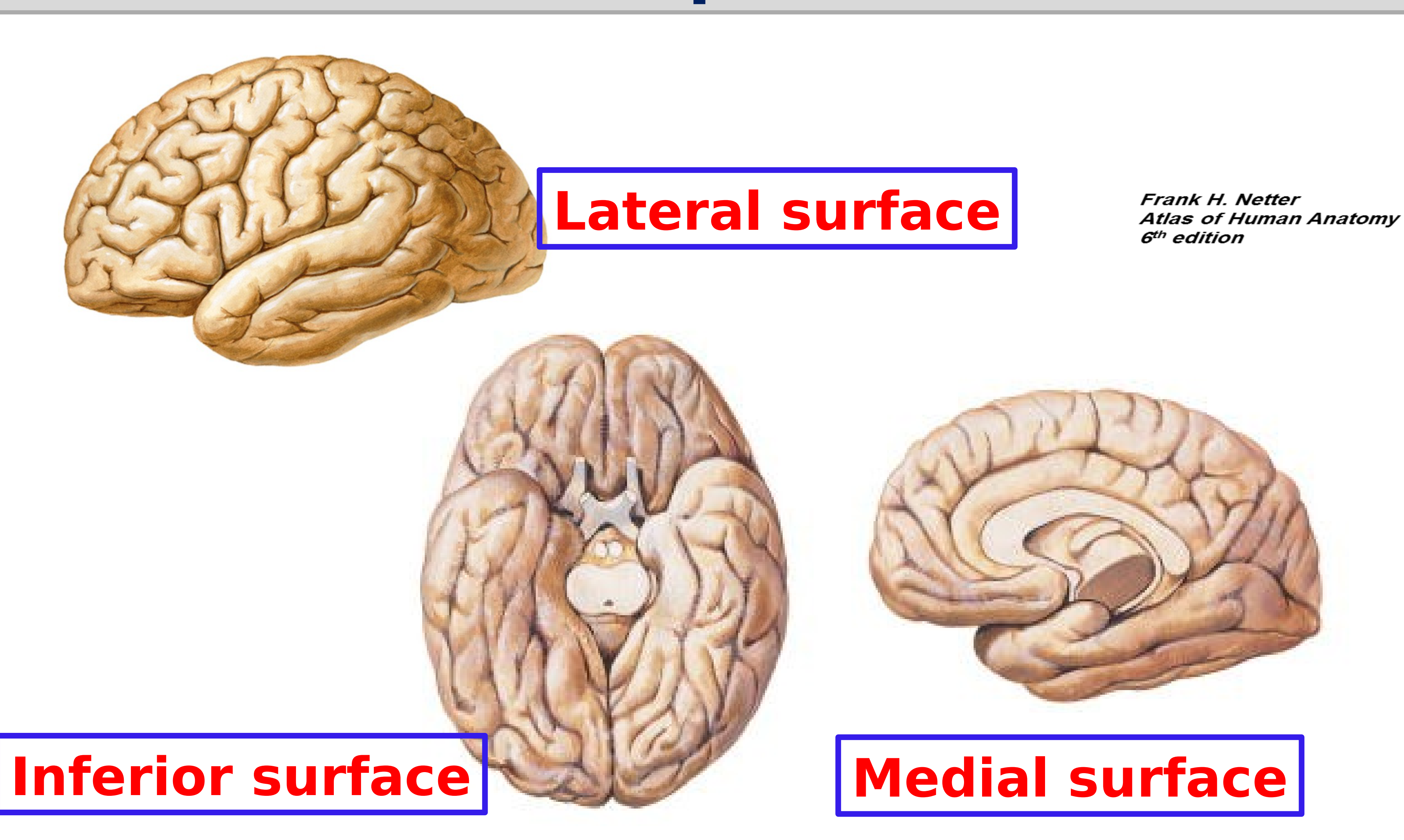


Surface of cerebral hemisphere is composed of grey matter (cerebral cortex) that is thrown into grooves “Sulci” separated by folds “Gyri” to increase the surface area of

Each cerebral hemisphere has 3 poles



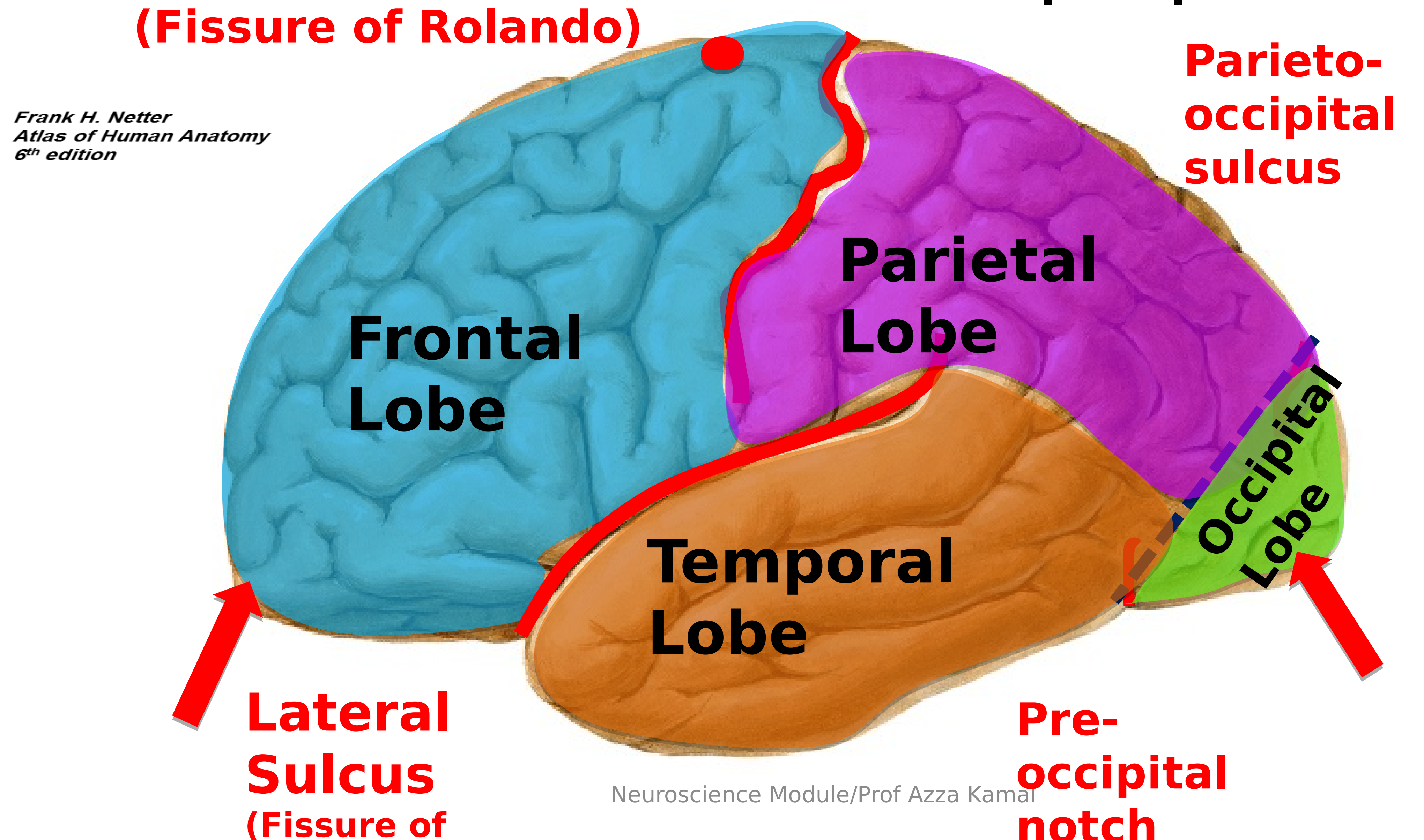
Each cerebral hemisphere has 3 surfaces



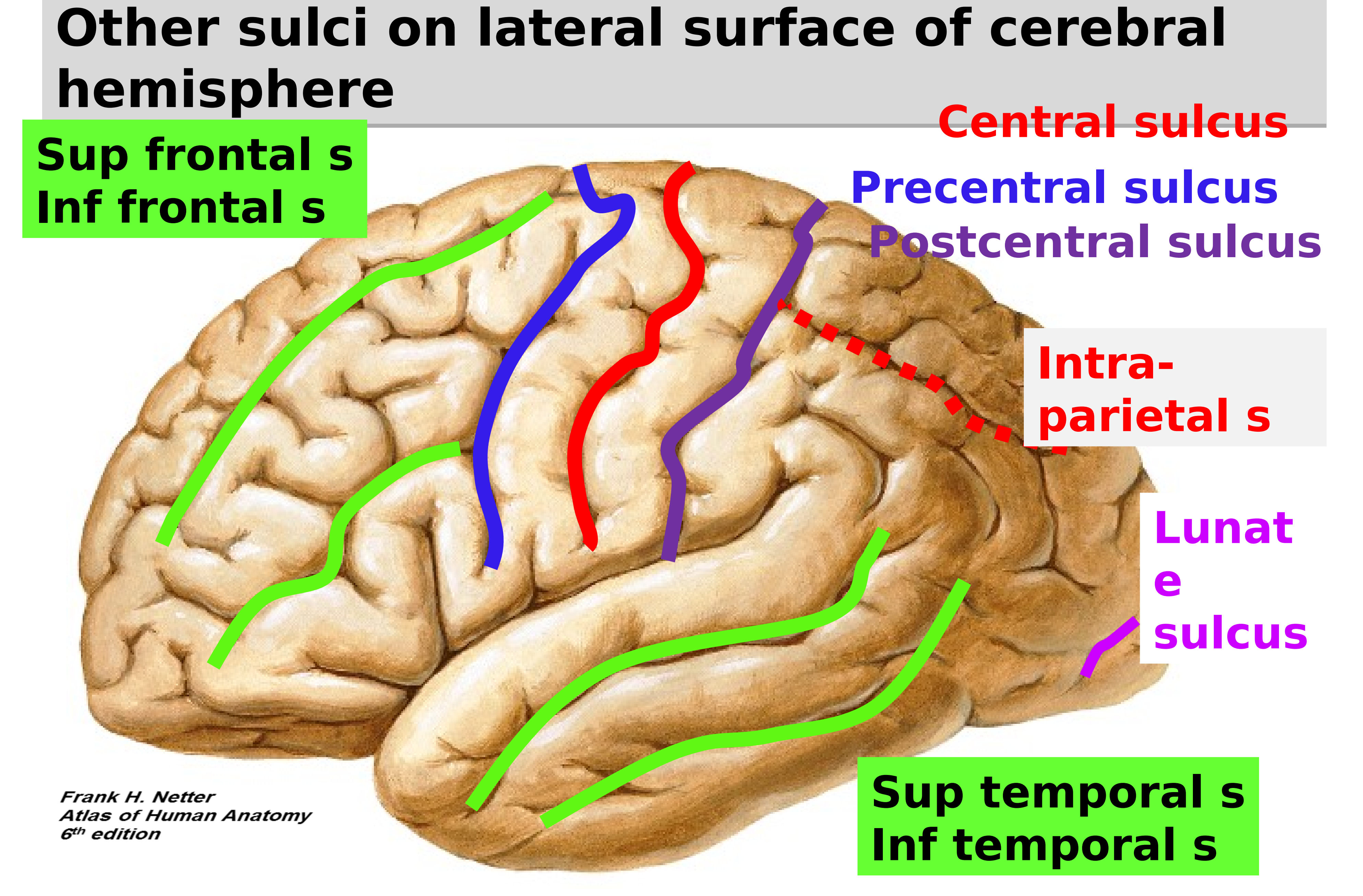
Main sulci that help to divide the cerebral hemisphere into lobes:

Central sulcus

One cm. behind midpoint between frontal & occipital poles



Other sulci on lateral surface of cerebral hemisphere



Gyri on lateral surface of cerebral hemisphere

Sup frontal s
Inf frontal s

Central sulcus

Precentral sulcus

Postcentral sulcus

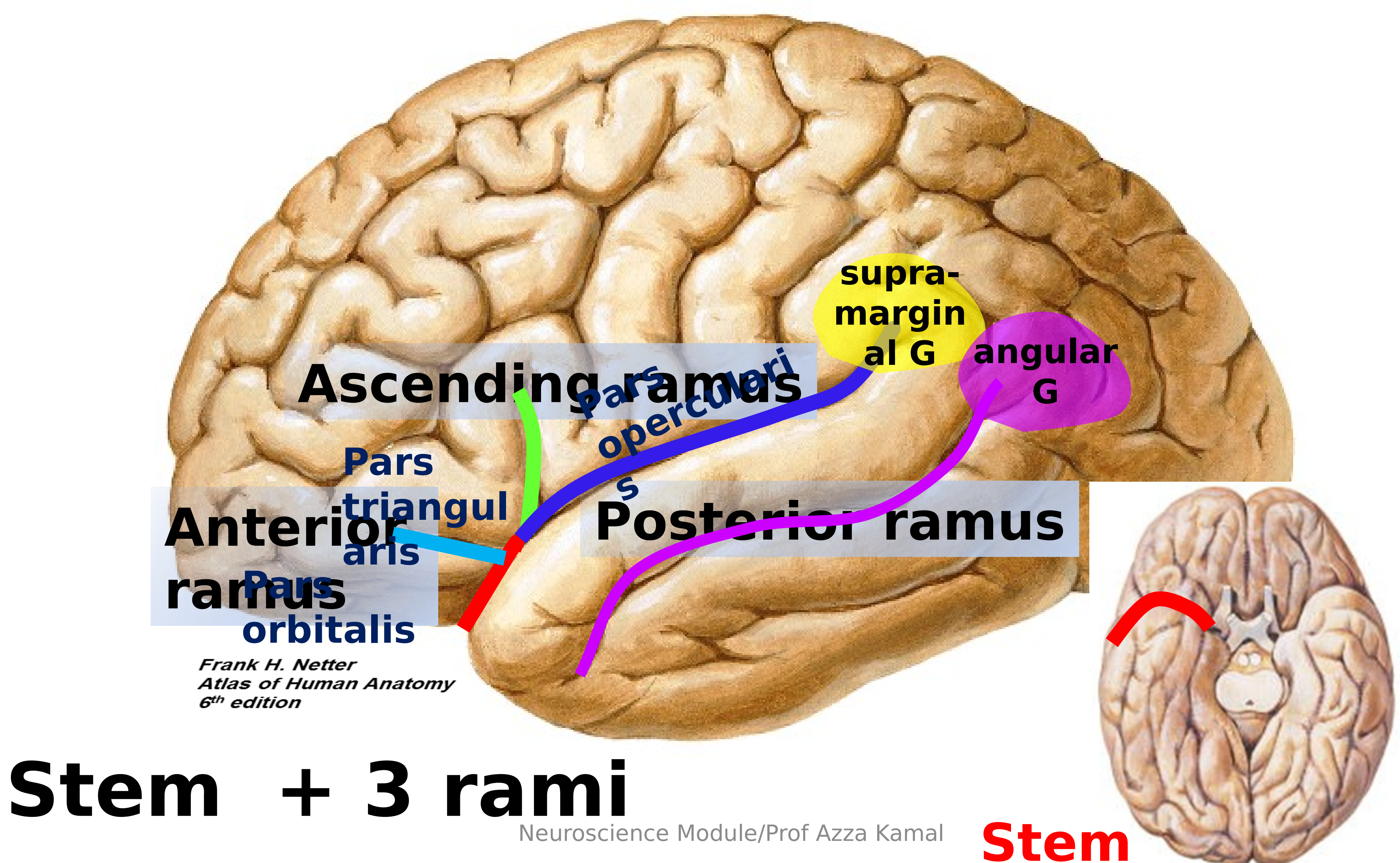
Intra-parietal s

Sup. Frontal Gyrus
Middle Frontal Gyrus
Inf. Frontal Gyrus
Precentral Gyrus
Postcentral Gyrus
Sup. Parietal Lobule
Inf. Parietal Lobule
Sup. Temporal Gyrus
Middle Temporal Gyrus
Inf. Temporal Gyrus

Sup temporal s
Inf temporal s

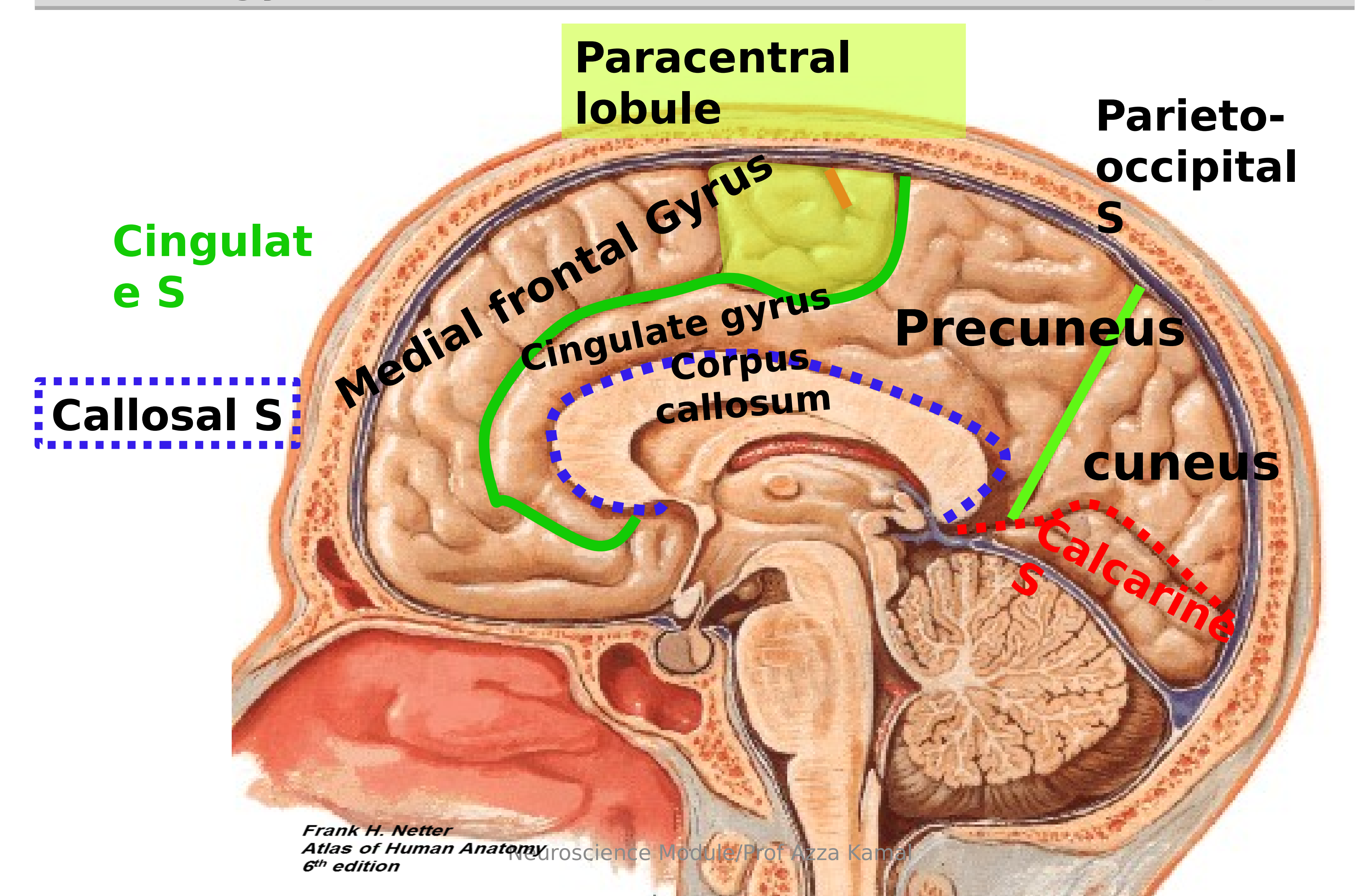
Frank H. Netter
Atlas of Human Anatomy
6th edition

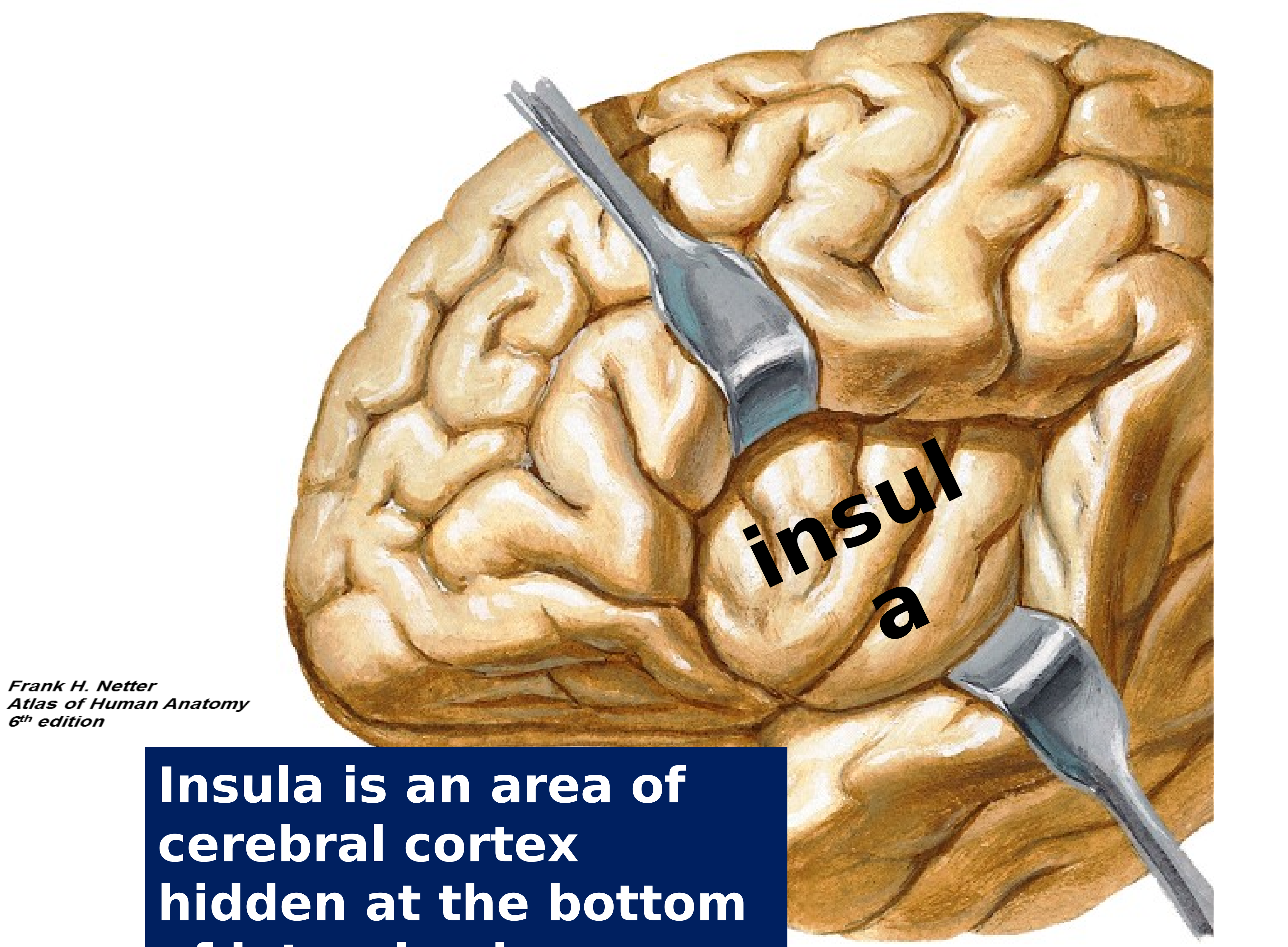
Lateral sulcus



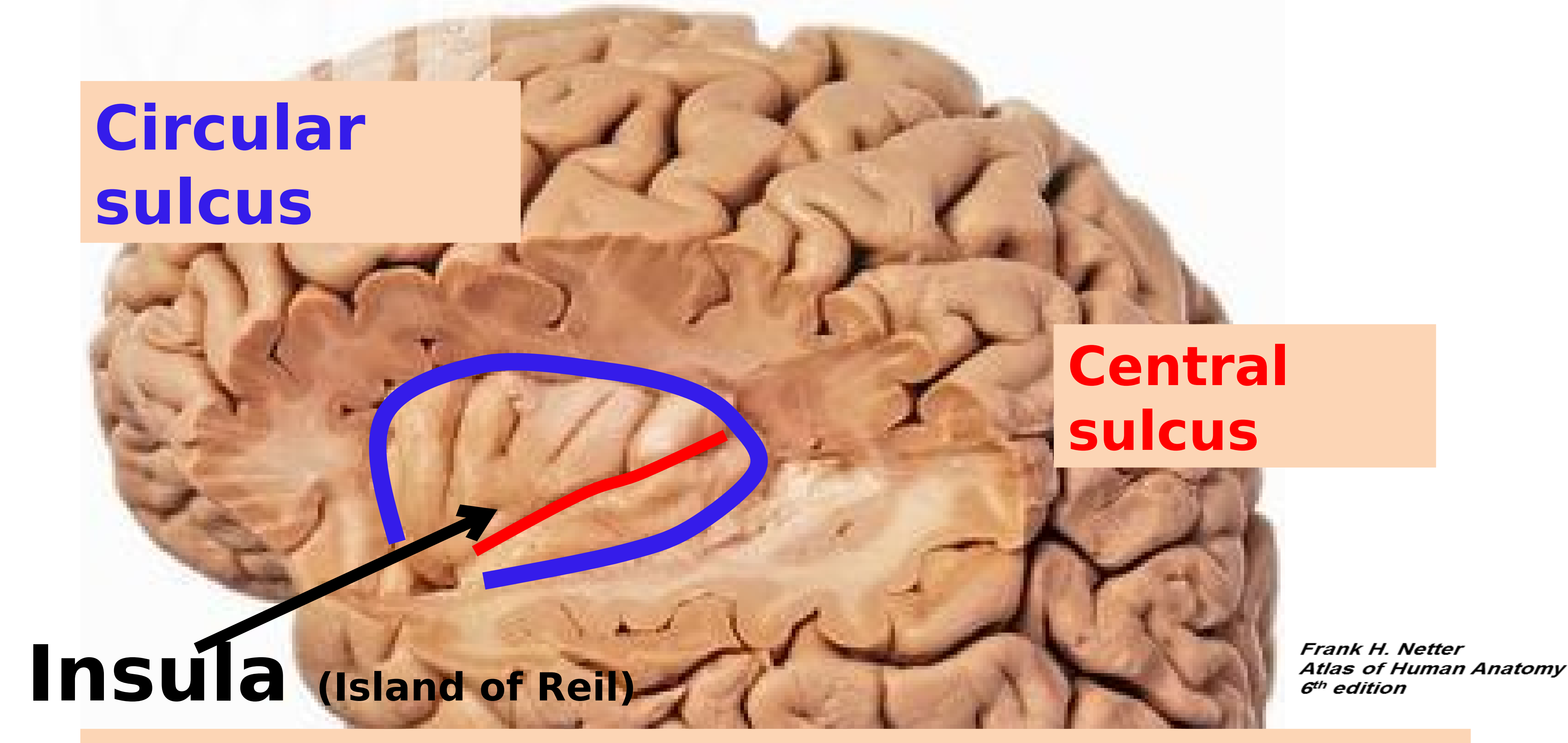
Stem + 3 rami

Sulci & gyri on medial surface of cerebral hemisphere





Insula is an area of cerebral cortex hidden at the bottom



Function of insula:

1) Ant. Part Smell, taste & visceral sensation (autonomic)

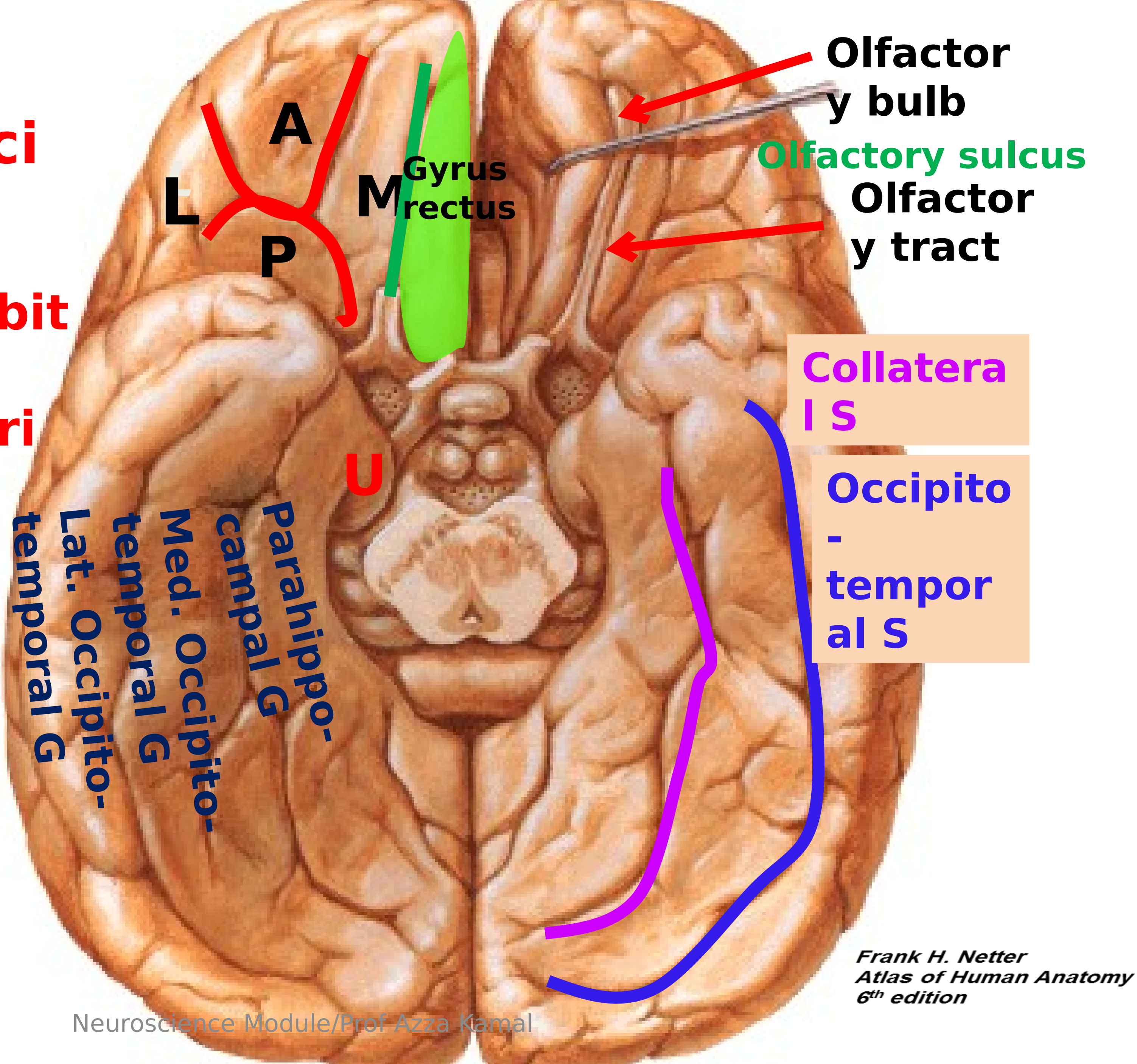
2) Post. Part 2nd somatosensory area

H- shaped orbital sulci

A anterior
P posterior
M medial
L lateral

Orbital gyri

U uncus

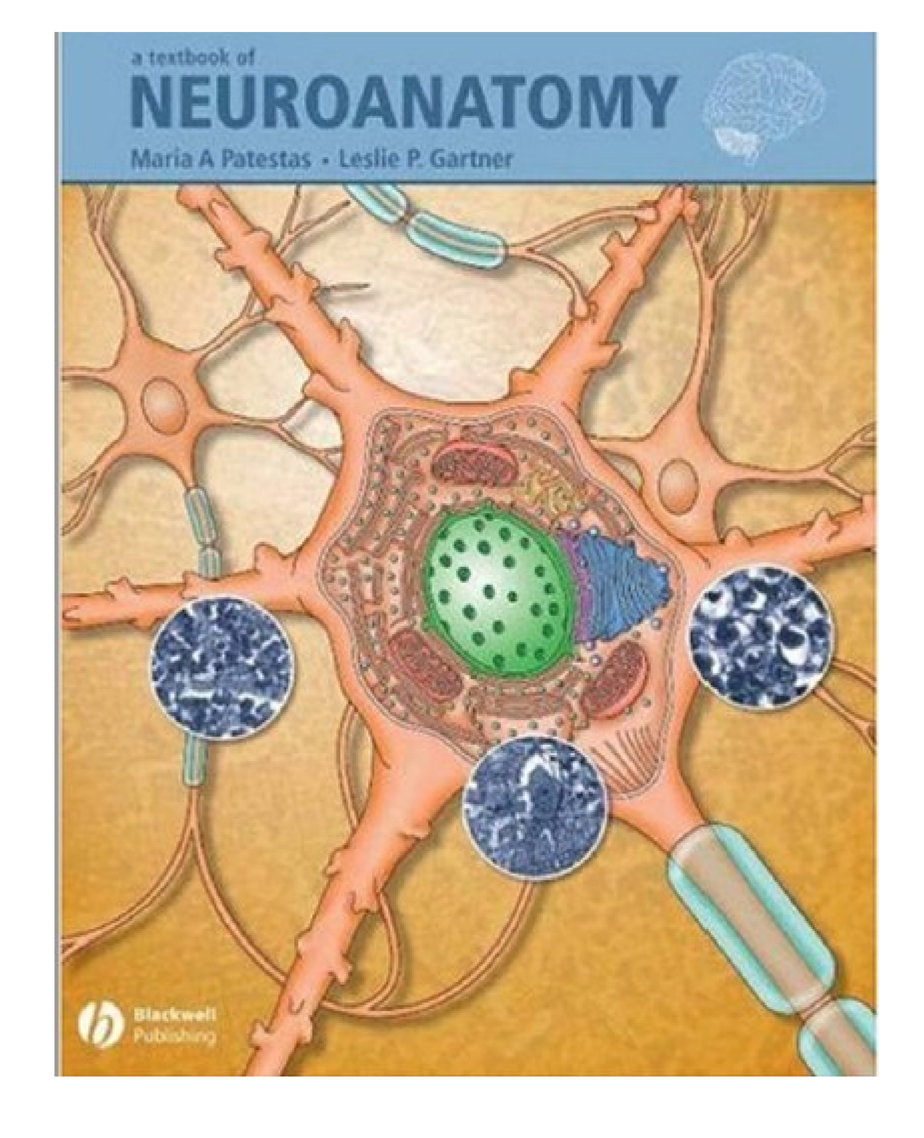


Sulci & Gyri on inferior

The following is an area of cortex hidden at the bottom of the lateral sulcus:

A. Pars orbitalis
B. Pars triangularis
C. Pars opercularis
D. Cuneus
E. Insula





Reference:
Clinical Neuroanatomy, Richard Snell, 7th edition
Sulci & gyri : Pages 257-262

Chapter 23: cerebral cortex . PP:402-405

Thank You